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Three New Species of *Essigella* (Homoptera: Aphididae)

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Essigella Del Guercio is a needle-feeding, linear-bodied genus of nearctic conifer aphids occurring on the Pinaceae. The genus has long been the subject of neglect and confusion among lachnines; currently 21 species names exist (Eastop and Hill Ris Lambers, 1976). After the generic description (Del Guercio, 1909), based upon *Lachnus californica* (Essig) (Essig, 1909), three species were added to the genus: *E. pini* Wilson (Wilson, 1919), *E. hoerneri* Gillette & Palmer and *E. fusca* Gillette & Palmer (Gillette and Palmer, 1924). The genus then sat taxonomically dormant until Hottes (1957, 1958) described 17 additional species. Unfortunately, all but four of Hottes' names are synonyms, and his key (Hottes, 1957) does not work because he failed to understand the complexity of character variation in the genus.

In response, Sorensen (in prep. a) revises the genus and provides a functional key, based upon multivariate analyses (Sorensen, 1983). Sorensen (1987) deduces a phylogeny for *Essigella*, based upon a new technique of using discriminant analysis with maximum-likelihood network generation algorithms. Most new species to be added to the genus (Sorensen, in prep. a) are members of species-complexes or groups, and require quantitative circumscription using multivariate techniques (Sorensen, in prep. b). Three, however, are not members of groups involving existing species and are described here. Measurements are given in ranges, followed by means and standard deviations, from individuals throughout the range of each species.

Essigella kathleenae Sorensen, NEW SPECIES
(Figure 1)

Type Series—USA, California, San Bernardino Co., 3 km S. jct. Hwy. 38 & Jenks Lake Rd., San Bernardino Mts., 2200 m, 16 SEP 1977, J. T. Sorensen, *Pinus lambertiana*; Sorensen 77I38. *Holotype*—vivip. apt.; on slide with 3 paratype vivip. apt., holotype at upper left (11 o'clock position). *Paratypes*—30 vivip. apt., same data, on 7 slides including holotype slide. Holotype retained in Sorensen collection, eventually to be deposited B.M.(N.H.), London; Paratype slides deposited: 1 slide in N.M.N.H., Washington DC, and 9 slides in Sorensen collection.

Viviparous Apterae—*Morphology* (n = 20): Body length: 1.35–2.01 (1.67 ± 0.18) mm. HEAD: Primary rhinarium on terminal antennal segment (V) not exceptionally distad, distance from tip of processus terminalis to distal face of rhinarial rim greater than 0.5 times diameter of rhinarium; distal face of rhinarial rim usually oblique to longitudinal axis of antennal segment; rhinarial membrane not conspicuously protuberant. Length of antennal segment V: 85–113 (102 ± 7) μ, processus terminalis: 28–43 (40 ± 4) μ; IV: 60–90 (75 ± 9) μ; III: 98–135 (118 ± 11)

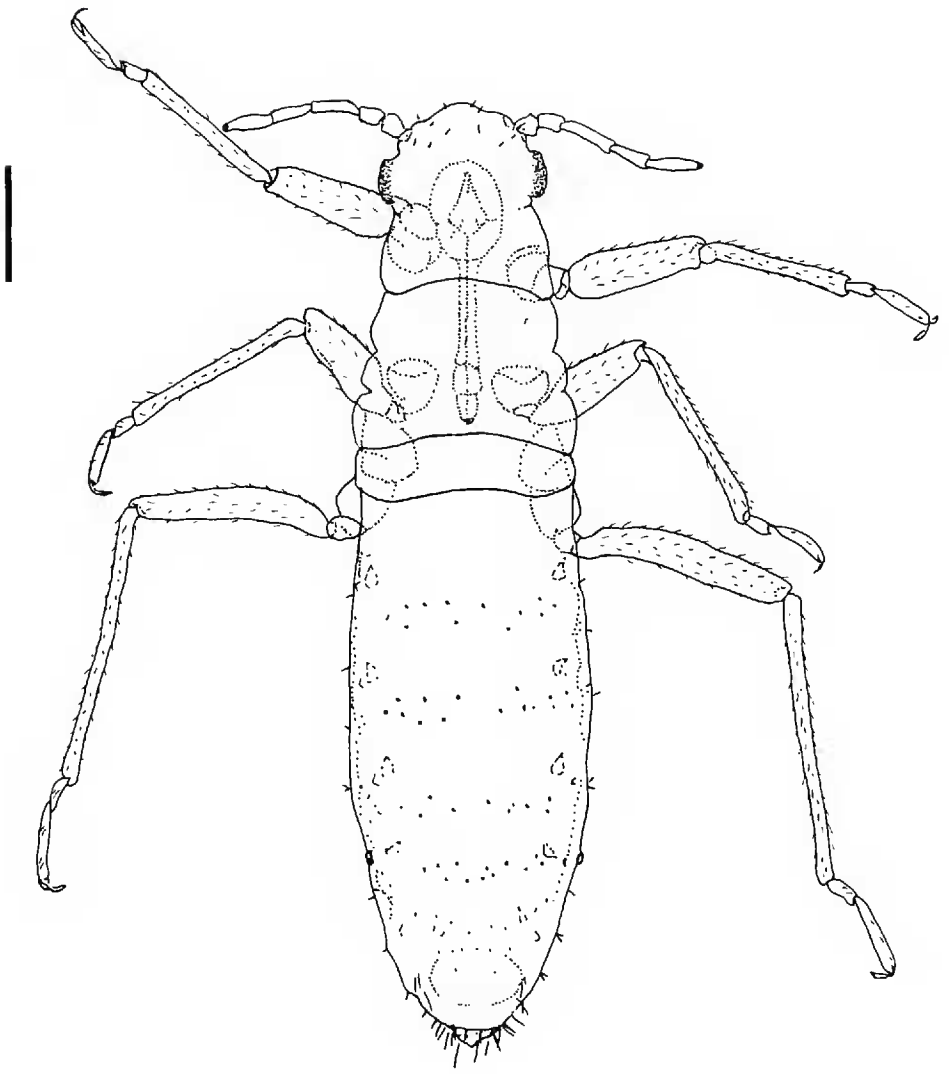

Figure 1. *Essigella kathleenae* n. sp. (viviparous aptera), type locality, 16 Sept. 1977 on *Pinus lambertiana* (JTS 77I38). Body setae omitted except frontals and setal positions on dorsum of abdomen. Measurement reference bar (upper left) = 0.2 mm.

μ; II: 55–68 (62 ± 4) μ. Longest frontal hairs: 8–25 (17 ± 6) μ, tips incrassate. Width of head: 215–258 (242 ± 11) μ. Length of stylets: 428–653 (581 ± 64) μ; ultimate rostral segment: 55–78 (66 ± 5) μ, rostral tip reaching metathorax to abdominal segment 3. Length of head + pronotum: 286–377 (334 ± 31) μ. THORAX: Length of mesothorax: 214–306 (280 ± 31) μ; metathorax: 93–133 (119 ± 12) μ. Meso- and metathorax not fused. ABDOMEN: Maximum distal width of flange on siphunculi: 23–38 (32 ± 4) μ; siphunculi flush to truncated conical, protrusion to 0.5 times maximum distal width. Ventral abdominal sclerites on segments II–IV subcircular, subquadrate to subelliptical; length: 36–60 (48 ± 8) μ, 1.3–2.1 times diameter of metatibiae. Dorsal hairs on abdominal terga II–IV: 11–14 (12 ± 1), tips sharp, in 2 irregular rows; marginal hairs 4–5 per segment each side. Hairs on abdominal tergum VIII: 7–13 (10 ± 2), length: 5–40 (14 ± 10) μ, tips incrassate to sharp, in 2 irregular rows. Cauda rounded; caudal protuberance moderately developed, to infrequently nearly absent; length of longest caudal hairs: 40–93 (61 ± 16) μ, tips sharp. LEGS: Length of metafemora: 316–541 (448 ± 67) μ; metatibiae: 428–704 (569 ± 77) μ; longest dorsal hairs on central one-third of metatibiae: 5–23 (13 ± 6) μ, 0.1–0.8 times diameter of metatibiae, tips incrassate; approximately equal or very gradually increasing distally, no hair length

dimorphism; longest ventral hairs on metatibiae: 10–25 (19 ± 5) μ, tips sharp. Length of metabasitarsus: 60–95 (79 ± 10) μ; metadistitarsus: 135–180 (162 ± 12) μ. Ratio of metadistitarsus to metabasitarsus averaging 2.05:1, greater than 1.9:1, and usually greater than 2.0:1.

*Pigmentation:*Color in life: Pale yellow throughout. Prepared specimens: Background of body dorsum pale (usually to 10, sometimes to 30, percent pigment density), unicolorous. Frontal hair bases and dorsal hair bases of abdomen concolorous with surrounding terga. Thoracic muscle attachment plates and dorsal muscle attachment plates of abdomen, pale, inconspicuous. Spiracular plates and ventral abdominal sclerites pale. Siphunculi concolorous with surrounding terga. Cauda, anal and subgenital plates pale, concolorous with abdominal terga, to slightly darker. Antennal segments V and IV pale, only very subtly darker than body dorsum, III very pale to distal one-third pale as V and IV; II concolorous with proximal III; I concolorous with frons. Pro-, meso- and metatibiae usually pale, concolorous with body dorsum, to very subtly darker. Distitarsi entirely pale to subtly dusky on distal one-third.

Ultimate Stadium Nymphs of Viviparous Apterae—Prepared specimens: Non-morphometrics as described for viviparous apterae except lacking body dorsum pigmentation syndrome; abdominal terga membranous with dorsal hairs, between muscle attachment plates, arising from distinct scleroites. Mesonotum with 2 sclerotized plates extending from muscle attachment sites to engulf neighboring hair bases; plates usually vague, faintly pigmented, diameter approximately equaling eye length.

Oviparae—Prepared specimens: Non-morphometrics as described for viviparous apterae, abdominal terga 1–7 fused, lightly to moderately sclerotic, including pleural areas, tergum 8 free; dorsal demarcations of anterad terga not evident; siphunculi incorporated into sclerotic dorsum; dorsal abdominal muscle attachment plates pale, unicolorous. Pseudorhinaria on metatibiae irregular, difficult to distinguish, 5–9.

Viviparous Alatae, Males, Fundatrices—Unknown.

Diagnosis—*Essigella kathleenae* can very usually be identified by the unique, exceptionally long metadistitarsus and short metabasitarsus. The length ratio of the metadistitarus to metabasitarus usually exceeds 2.0:1, and only rarely approaches 1.9:1, the upper value for all other *Essigella*, except some *E. kirki* (see: *E. kirki* diagnosis) *Essigella kathleenae* is consistently pale and yellow in life.

Discussion—*E. kathleenae* occurs in California and southwestern Oregon on *Pinus lambertiana*. It is considered monophagous, although rare collections have been made on other pine species, probably in part though my collection error. *E. kathleenae* is most closely related to *E. kirki*, which together are the most primitive group of *Essigella* (Sorensen, 1987). The species is named for my wife Kathleen H. Sorensen, who accompanied me in the field as my botanist, and encouraged the upcoming revision of this genus. Her help is greatly appreciated.

Material Examined—*CALIFORNIA*. CALAVERAS Co.: 18 km E. Arnold, Hwy. 4, 1680 m, 17–vii–1977, J. T. Sorensen (JTS 77G45), *P. lambertiana*, (apt.). DEL NORTE Co.: Panther Flat Cmpgd., Six Rivers Nat'l. Forest, Pioneer Rd. & Hwy. 199, E. Gasquet, 4–vii–1978, J. T. Sorensen (JTS 78G7), *P. monticola*, (apt.). EL DORADO Co.: Lake Tahoe, Emerald Bay, 1980 m, 16–vii–1977, J. T. Sorensen (JTS 77G30), *P. lambertiana* (apt.). FRESNO Co.: jct. Hwy. 180 & Sequoia Lake turnoff, nr. Pinehurst, 1710 m, 13–viii–1977, J. T. Sorensen (JTS 77H10), *P.*

lambertiana, (apt.). KERN Co.: Tiger Flat Rd., N. Hwy. 155, nr. Alta Sierra, 1890 m, 20–ix–1977, J. T. Sorensen (JTS 77I64), *P. lambertiana*, (apt.); *ibid.*, (JTS 77I66), *P. jeffreyi*, (apt.). LOS ANGELES Co.: 3 km S.E. Big Pines, Hwy. 2, E. Blue Ridge Summit, 2200 m, 17–ix–1977, J. T. Sorensen (JTS 77I48), *P. lambertiana,* (apt., ovip.). MARIPOSA Co.: Yosemite Nat'l. Park, 13 km W. Crane Flat, jct. Hwy. 120, 2140 m, 1–viii–1977, J. T. Sorensen (JTS 77H6), *P. lambertiana*, (apt.). MENDOCINO Co.: Fish Rock Rd., 27 km E. Hwy. 1, 490 m, 23–vii–1977, J. T. Sorensen (JTS 77G49), *P. lambertiana,* (apt.). MONTEREY Co.: Cone Peak Rd., 13 km N. jct. Nacimento-Fergusson Rd., Los Pardes Nat'l. Forest, 1310 m, 4–ix–1977, J. T. Sorensen (JTS 77I10), *P. lambertiana,* (apt.). PLACER Co.: 5 km S.W. Whitmore, Hwy. 80, 1430 m, 25–vi–1977, J. T. Sorensen (JTS 77F2), *P. lambertiana* (apt.). PLUMAS Co.: 6 km W. jct. Hwy. 36 & 89 on 36, 1460 m, 10–vii–1977, J. T. Sorensen (JTS 77G22), *P. lambertiana,* (apt.); 8 km E. Chester, Hwy. 36, 1520 m, 4–vii–1977, J.T. Sorensen (JTS 77G16), *P. lambertiana*, (apt.). RIVERSIDE Co.: South Ridge Rd., nr. Idyllwild, 1770 m, 9–ix–1977, J. T. Sorensen (JTS 77I21), *P. lambertiana,* (apt.). SAN BERNARDINO Co.: (type series) San Bernardino Mts., 3 km S. jct. Hwy. 38 & Jenks Lake Rd., 2200 m, 16–ix–1977, J. T. Sorensen (JTS 77I38), *P. lambertiana,* (apt.); *ibid.*, 3 km S. Lake Gregory, 1490 m, 17–ix–1977, (JTS 77I45). SISKIYOU Co.: Mt. Shasta Ski Bowl Rd., 2450 m, 2–vii–1977, J. T. Sorensen & D. J. Voegtlin (JTS 77G8), *P. lambertiana,* (apt.). TEHAMA Co.: Lanes Valley Rd., nr. jct. Hwy. 36, 490 m, 4–vii–1977, J. T. Sorensen (JTS 77G17), *P. sabiniana,* (apt.). TRINITY Co.: E. of County Line Rd., 5 km S. Buckhorn Summit of Hwy. 299, W. Tower, 1530 m, 20–viii–1977, J. T. Sorensen (JTS 77H19), *P. lambertiana,* (apt.). TUOLUMNE Co.: 2 km E. Groveville, Hwy. 120, 910 m, 30–vii–1977, J. T. Sorensen (JTS 77G62), *P. lambertiana*, (apt.); *ibid.,* (JTS 77G63), *P. ponderosa,* (apt.). VENTURA Co.: Reyes Peak Rd., 10 km E. Pine Mt. Summit of Hwy. 33, 2200 m, 19–ix–1977, J. T. Sorensen (JTS 77I58), *P. lambertiana,* (apt.). *OREGON*. JACKSON Co.: 15 km S. Union Creek, Hwy. 62, 850 m, 5–vii–1978, J. T. Sorensen (JTS 78G17), *P. lambertiana,* (apt.).

Essigella alyeska Sorensen, New Species
(Figure 2)

Type Series—USA, Alaska, College (Univ. Alaska campus), nr. Fairbanks, 24 JUN 1979, J. T. Sorensen, *Picea glauca;* Sorensen 79F1. *Holotype*—vivip. apt.; on slide with 1 paratype vivip. apt., holotype on top (12 o'clock position). *Paratypes*—25 vivip. apt. same data, on 13 slides including holotype slide. Holotype retained in Sorensen collection, eventually to be deposited B.M.(N.H.), London; Paratype slides deposited: 1 slide in N.M.N.H., Washington DC, and 12 slides in Sorensen collection.

Viviparous Apterae—*Morphology* (n = 10): Body length: 1.42–1.65 (1.51 ± 0.07) mm. HEAD: Primary rhinarium on terminal antennal segment (V) not exceptionally distad, distance from tip of processus terminalis to distal face of rhinarial rim greater than 0.5 times diameter of rhinarium; distal face of rhinarial rim usually oblique to longitudinal axis of antennal segment; rhinarial membrane not conspicuously protuberant. Length of antennal segment V: 100–120 (108 ± 8) μ, processus terminalis: 28–38 (34 ± 4) μ; IV: 83–98 (86 ± 5) μ; III: 138–170 (151 ± 11) μ; II: 63–73 (67 ± 3) μ. Longest frontal hairs: 33–53 (41 ± 7) μ, tips

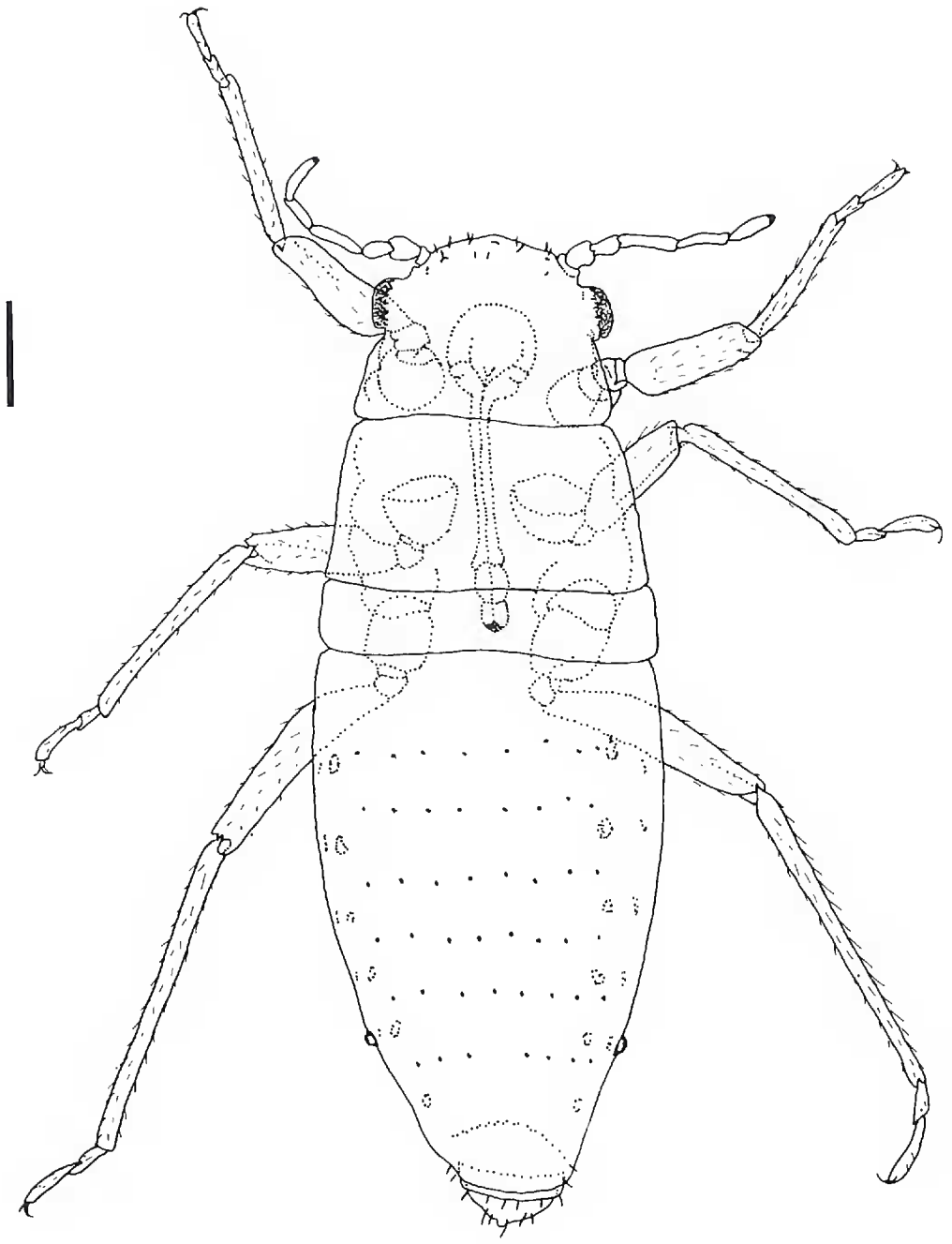

Figure 2. *Essigella alyeska* n. sp. (viviparous aptera), Perrault Falls, Ontario, 17 July 1963 on *Pinus banksiana* (APV 63–147–0). Body setae omitted except frontals and setal positions on dorsum of abdomen. Measurement reference bar (upper left) = 0.2 mm.

incrassate, rarely sharp. Width of head: 286–301 (292 ± 6) μ. Length of stylets: 561–775 (600 ± 69) μ; ultimate rostral segment: 63–85 (74 ± 8) μ, rostral tip reaching metathorax to abdominal segment 1. Length of head + pronotum: 337–388 (361 ± 16) μ. THORAX: Length of mesothorax: 265–316 (298 ± 17) μ; metathorax: 102–118 (108 ± 7) μ. Meso- and metathorax not fused. ABDOMEN: Maximum distal width of flange on siphunculi: 43–48 (46 ± 2) μ; siphunculi strongly protuberant, protruding 0.7–1.1 times maximal distal width. Ventral abdominal sclerites on segments II–IV irregular, to subcircular when large; length: 26–40 (35 ± 5) μ, 0.8–1.4 times diameter of metatibiae. Dorsal hairs on abdominal terga II–IV: 7–9, usually 8, tips sharp, in 1 row; marginal hairs 2 each side, per segment. Hairs on abdominal tergum VIII: 6–8, length: 15–45 (36 ± 10) μ, tips incrassate to sharp, in 1 row. Cauda broadly rounded; caudal protuberance poorly developed to absent; length of longest caudal hairs: 83–100 (91 ± 7) μ, tips sharp. LEGS: Length

of metafemora: 428–520 (488 ± 33) μ; metatibiae: 663–785 (731 ± 44) μ; longest dorsal hairs on central one-third of metatibiae: 30–45 (38 ± 5) μ, 0.7–1.5 times diameter of metatibiae, tips incrassate, rarely sharp; approximately equal or very gradually increasing distally, no hair length dimorphism; longest ventral hairs on metatibiae: 23–33 (28 ± 7) μ, tips sharp. Length of metabasitarsus: 95–103 (99 ± 2) μ; metadistitarsus: 135–158 (147 ± 8) μ. Ratio of metadistitarsus to metabasitarsus averaging 1.48:1, less than 1.9:1.

Pigmentation: Color in life: Body gray-green, head yellow-orange. Prepared specimens: Background of body dorsum pale to light brown (to 20 percent pigment density), unicolorous. Frontal hair bases and dorsal hair bases of abdomen concolorous with surrounding terga. Thoracic muscle attachment plates and dorsal muscle attachment plates of abdomen pale, inconspicuous, to moderate brown, conspicuous. Spiracular plates and ventral abdominal sclerites pale, to dark brown, conspicuous. Siphunculi concolorous with surrounding terga, to subtly darker, especially distally near flange. Cauda, anal and subgenital plates light to moderate brown, subtly to substantially darker than abdominal terga. Antennal segments V and IV light to moderate brown, IV sometimes proximally pale; III pale if proximal IV pale, to dusky on distal one-half, if IV entirely darker; II subtly darker than proximal III; I as dark as V, or nearly so, and subtly darker than frons. Pro-, meso- and metatibiae usually concolorous, pale, equivalent to body dorsum, sometimes slightly dusky on distal tip, entire tibiae infrequently slightly darker. Distitarsi entirely dusky.

Ultimate Stadium Nymphs of Viviparous Apterae—Prepared specimens: Non-morphometrics as described for viviparous apterae except lacking body dorsum pigmentation syndrome; abdominal terga membranous with dorsal hairs, between muscle attachment plates, arising from distinct scleroites. Mesonotum lacking 2 sclerotized plates extending from muscle attachment sites to engulf neighboring hair bases; area surrounding muscle attachment sites membranous.

Viviparous Alatae—Prepared specimens: Non-morphometrics as described for viviparous apterae except lacking body dorsum pigmentation syndrome; abdominal terga normally membranous, dorsal hairs between muscle attachment plates sometimes arising from distinct scleroites; antennal segments often as dark as tibiae, except proximal one-fifth of III pale. Antennal segment III with 0–2, IV with 0, secondary rhinaria. Epicranial suture absent to weakly developed. Forewing medius with furcation arising on central one-third of vein; cubital base usually arising distad, uncommonly proximad, on subcosta with distance between anal and cubital bases on subcosta usually relatively large, ca. 20–40 percent or more of anal vein length; medius, especially cubitus and anal veins usually distinct, except infrequently proximad 10–15 percent vague. Abdominal terga lacking irregular sclerites which engulf or join muscle attachment plates and dorsal hair bases or scleroites.

Oviparae, Males, Fundratrices—Unknown.

Diagnosis—*Essigella alyeska* requires the combination of all the following characters for identification, since the species may be confused with other pale *Essigella*: 8 dorsal and 2 marginal hairs on abdominal terga 2–4; 6, probably rarely to 8, hairs on abdominal tergum 8; presence of (usually) small, often asterisk-like, (instead of always large, sub elliptical) ventral abdominal sclerites on segments 2–4; absence of a lateral fusion of the meso- and metathoraces; absence of an exceptionally protuberant primary rhinarium; small non-invasive mesonotal muscle attachment plates on later stadia nymphs of apterae.

Discussion—*E. alyeska* is an uncommon species ranging from the interior of Alaska, on *Picea glauca*, to lower eastern Canada, on *Pinus banksiana*. My sampling of *Pinus, Picea glauca*, and other *Picea*, over their ranges in western Canada and the western U.S. have not yielded the aphid; nor was it easily found sampling *Picea glauca* throughout central Alaska. Samples from Quebec and Ontario exist, however, on *Pinus banksiana*. I anticipate that *E. alyeska* will be found in the northern Rocky Mountains in the U.S., and across Canada, wherever the hosts occur. *E. alyeska* is a broad-shaped species (see: Sorensen, in prep. a), but body width characteristics are not suggested here because of the measurement error often associated with non-standardized (compressed) slides made by others; I have attempted to standardize my *Essigella* slides for non-compression (Sorensen, 1983). *E. alyeska* is related to the *E. knowltoni* complex (*E. knowltoni* and *E. braggi*, plus an undescribed member) that feed on the western members of *Pinus (Pinus)* Subsection Contortae (Sorensen, 1987), of which *P. banksiana* is an eastern member (Little and Critchfield, 1969). The limited collections of *E. alyeska* (4) preclude adequate understanding of probable variation over its range. The aphid's species name is the Athabascan Indian term for "Alaska."

Material Examined—*ALASKA*. 20 km N. of E. entrance Mt. McKinley Nat'l. Park, 15–vii–1979, J. T. Sorensen (JTS 79G1), *Picea glauca*, (apt.); (type series) College, (Univ. Alaska Campus), nr. Fairbanks, 24–vi–1979, J. T. Sorensen (JTS 79F1), *Picea glauca*, (apt.). *ONTARIO*. Perrault Falls, 17–vii–1963, G. A. Bradley (63–147–0–APV), *Pinus banksiana*. *QUEBEC*. St. Bruno, Lac St. Jean, 10–xiii–1985, A. St. Hilaire, *Pinus banksiana*.

Essigella kirki Sorensen, New Species
(Figure 3)

Type Series—USA, New Mexico, Santa Fe Co., ca. 30 km N.E. Santa Fe, Hwy. 475, 3100 m, 10 AUG 1978, J. T. Sorensen, *Pinus flexilis;* Sorensen 78H55. *Holotype*—vivip. apt.; on slide with 3 paratype vivip. apt., holotype at lower left (8 o'clock position). Paratypes—19 vivip. apt., same data, on 5 slides including holotype slide. Holotype retained in Sorensen collection, eventually to be deposited B.M.(N.H.), London; Paratype slides deposited: 1 slide in N.M.N.H., Washington DC, and 3 slides in Sorensen collection.

Vivparous Apterae—*Morphology* (n = 20): Body length: 1.73–2.13 (1.92 ± 0.13) mm. HEAD: Primary rhinarium on terminal antennal segment (V) not exceptionally distad, distance from tip of processus terminalis to distal face of rhinarial rim greater than 0.5 times diameter of rhinarium; distal face of rhinarial rim usually oblique to longitudinal axis of antennal segment; rhinarial membrane not conspicuously protuberant. Length of antennal segment V: 95–133 (117 ± 10) μ, processus terminalis: 28–45 (37 ± 5) μ; IV: 70–91 (82 ± 7) μ; III: 141–188 (157 ± 15) μ; II: 63–73 (68 ± 3) μ. Longest frontal hairs: 10–43 (28 ± 9) μ, tips incrassate. Width of head: 245–316 (285 ± 19) μ. Length of stylets: 530–694 (608 ± 55) μ; ultimate rostral segment: 68–83 (76 ± 5) μ, rostral tip reaching metathorax to abdominal segment 1. Length of head + pronotum: 367–439 (399 ± 24) μ. THORAX: Length of mesothorax: 296–388 (347 ± 28) μ; metathorax: 112–163 (138 ± 15) μ. Meso- and metathorax not fused. ABDOMEN: Maximum distal width of flange on siphunculi: 45–55 (50 ± 4) μ; siphunculi nearly flush to truncated conical, protruding to 1.0 times maximal distal width. Ventral abdominal sclerites on segments II-IV subquadrate, subcircular to subelliptical;

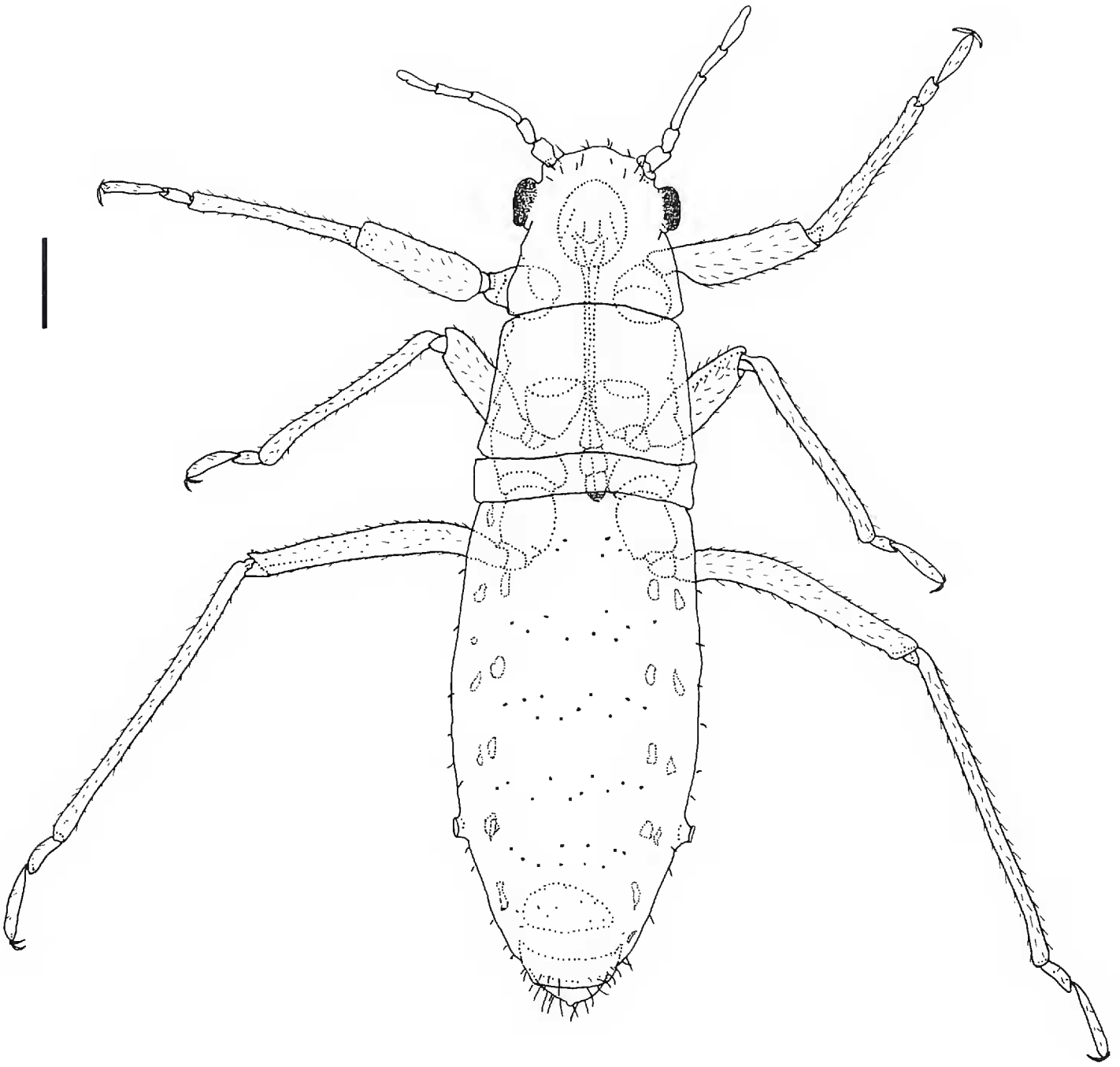

Figure 3. *Essigella kirki* n. sp. (viviparous aptera), type locality, 10 Aug 1978 on *Pinus flexilis* (JTS 78H55). Body setae omitted except frontals and setal positions on dorsum of abdomen. Measurement reference bar (upper left) = 0.2 mm.

length: 50–68 (59 ± 6) μ,. 1.2–2.0 times diameter of metatibiae. Dorsal hairs on abdominal terga II-IV: 10–14 (11 ± 1), tips sharp, in 2 irregular rows, lateral-most hair usually in anterad row; marginal hairs 4–6 per segment each side. Hairs on abdominal tergum VIII: 10–14 (11 ± 1), length: 5–43 (23 ± 11) μ, tips incrassate to rarely sharp, in 2 irregular rows. Cauda rounded; caudal protuberance moderately developed to frequently nearly absent; length of longest caudal hairs: 70–103 (86 ± 10) μ, tips sharp. LEGS: Length of metafemora: 500–663 (578 ± 53) μ; metatibiae: 622–900 (755 ± 70) μ; longest dorsal hairs on central one-third of metatibiae: 20–30 (24 ± 3) μ, 0.1–0.6 times diameter of metatibiae, tips incrassate, approximately equal or very gradually increasing distally, no hair length dimorphism; longest ventral hairs on metatibiae: 13–28 (23 ± 4) μ, tips sharp. Length of metabasitarsus: 93–118 (104 ± 7) μ; metadistitarsus: 165–213 (188 ± 13)

μ. Ratio of metadistitarsus to metabasitarsus averaging 1.81:1, usually less than 1.9:1, rarely reaching 2.0:1 or slightly more.

Pigmentation: Color in life: Gray-green, occasionally pale yellow throughout. Prepared specimens: Background of body dorsum pale (to 10 percent pigment density), unicolorous. Frontal hair bases and dorsal hair bases of abdomen concolorous with surrounding terga. Thoracic muscle attachment plates pale, inconspicuous to conspicuous. Dorsal muscle attachment plates of abdomen conspicuous, pale, infrequently dusky. Spiracular plates and ventral abdominal sclerites usually light brown, slightly darker than background of abdominal terga, to pale. Siphunculi concolorous with surrounding terga. Cauda, anal and subgenital plates concolorous with abdominal terga. Antennal segments V and IV slightly to moderately dusky over entire segment, to moderately brown distally; III pale; II and I concolorous with frons. Pro-, meso- and metatibiae usually pale, concolorous, equivalent to body dorsum; frequently tibiae subtly dusky at distal tip, rarely entire tibiae moderately dusky, slightly darker than body dorsum. Distitarsi usually subtly dusky distally to moderate brown, varying with antennae, infrequently entirely dusky with tibiae.

Ultimate Stadium Nymphs of Viviparous Apterae—Prepared specimens: Non-morphometrics as described for viviparous apterae except lacking body dorsum pigmentation syndrome; abdominal terga membranous with dorsal hairs, between muscle attachment plates, arising from distinct scleroites. Mesonotum with 2 sclerotized plates extending from muscle attachment sites to engulf neighboring hair bases; plates usually vague, faintly pigmented, diameter approximately equaling eye length.

Oviparae—Prepared specimens: Non-morphometrics as described for viviparous apterae except abdominal terga 1–6 fused, lightly to moderately sclerotic, including pleural areas, while 7 and 8 free; dorsal demarcations of anterad terga not evident; siphunculi usually incorporated into sclerotic dorsum, to free; dorsal abdominal muscle attachment plates pale, unicolorous except those between terga 6–7 darker. Pseudorhinaria on metatibiae irregular, difficult to distinguish, 7–11.

Viviparous Alatae, Males, Fundatrices—Unknown.

Diagnosis—*Essigella kirki* can easily be confused with other pale individuals of *Essigella* and requires the following character combination for identification: 10 or more dorsal hairs on abdominal terga 2–4 in 2 rows with (usually) the lateral-most hair in the anterad row; usually 10 or more hairs on the dorsum of abdominal tergum 8; lacking a protuberant, exceptionally distad primary rhinarium; having a metadistitarsus to metabasitarsus ratio of usually less than 1.9:1, but rarely to 2.0:1 (mean: 1.81:1 for *E. kirki*, 2.05:1 for *E. kathleenae*). Even with these attributes, *E. kirki* can still be confused with pale specimens of *E. fusca* and *E. braggi* (as well as other undescribed *Essigella* [Sorensen, in prep. a]). Most pale *E. fusca* and some pale *E. braggi* separate by having the longest dorsal hairs on the central part of the mesotibia more than 0.7 times tibial diameter, and usually less than 10 hairs on the dorsum of abdominal tergum 8. All observed *E. braggi* with 10 or more dorsal hairs on abdominal terga 2–4 and 8 differ from *E. kirki* by having the longest dorsal metatibial hairs in excess of 1.0 times tibial diameter. Rare confusing *E. braggi* are anticipated, and could be separated by their broad head on non-compressed slides, and by usually longer frontal hairs (see: Sorensen in prep. a, 1983).

Discussion—*E. kirki* is a common, very nearly monophagous species, which feeds on *Pinus flexilis* and *P. strobiformis*. It ranges with these hosts throughout the Rocky

Mountains, from Montana to Arizona and New Mexico; southern Sierra Nevada (east slope) and White Mountains of California; presumably into Mexico. *E. kirki* is closest in relationship to *E. kathleenae*, but differs in bivariate plots of (a) head width between the outer antennal socket rims vs body length and (b) metadistitarus vs metabasitarsus lengths, and in discriminant function and principal component delimitations employing the 26 characters used by Sorensen (in prep. a, 1983) to circumscribe all *Essigella* species. *E. kirki* is relatively homogenous morphologically, and always pale unlike several other *Essigella* species which can grade from pale to fully pigmented syndromes; in this respect it resembles *E. kathleenae*. *E. kirki*'s only apomorphy, a bipartite sclerotic dorsum of the oviparae differs from more fused oviparae shield of *E. kathleenae*, and appears to be a homoplasy with the *Essigella fusca* complex (see: Sorensen in prep a, 1983). The species is named for my son Kirk H. Sorensen.

Material Examined—*ARIZONA*. APACHE Co.: Lake Harney Rd. (Hwy. 473), nr. McNary, 2440 m, 11–ix–1978, J. T. Sorensen (JTS 78I14), *P. strobiformis*, (apt.). COCHISE Co.: nr. Rustler Park, Chiracahua Mts., 2500 m, 16–ix–1978, J. T. Sorensen (JTS 78I50), *P. strobiformis*, (apt.). *CALIFORNIA*. INYO Co.: Lake Sabrina, nr. Bishop, 2750 m, 1–viii–1977, J. T. Sorensen (JTS 77H2), *P. flexilis*, (apt.). INYO Co.: Onion Valley Cmpgd., 24 km W. Independence, 2770 m, 4–viii–1978, J. T. Sorensen (JTS 78H13), *P. flexilis,* (apt.). *COLORADO*. SAN JUAN Co.: 20 km N. Purgatory, 3020 m, 8–viii–1978, J. T. Sorensen (JTS 78H47), *P. flexilis,* (apt.). *MONTANA*. CARBON Co.: Red Lodge, 1770 m, 20–viii–1978, J. T. Sorensen (JTS 78H115), *P. flexilis,* (apt.). *NEVADA*. WHITE PINE Co.: Wheeler Peak, 3140 m, 26–viii–1978, J.T. Sorensen (JTS 78H147), *P. flexilis*, (apt., ovip.). *NEW MEXICO*. OTERO Co.: 3 km W. Cloudcroft, Hwy. 82, 2560 m, 13–ix–1978, J. T. Sorensen (JTS 78I22), *P. strobiformis*, (apt., ovip.). SANTA FE Co.: (type series) 30 km N.E. Santa Fe, Hwy. 475, 3100 m, 10–viii–1978, J. T. Sorensen (JTS 78H55), *P. flexilis,* (apt.). SIERRA Co.: Emory Pass, Hwy. 90, W. Kingston, 2470 m, 14–ix–1978, J. T. Sorensen (JTS 78I34), *P. strobiformis*, (apt.). *UTAH*. DUCHESNE Co.: 19 km N.E. Castle Gate, Hwy. 33, 2770 m, 25–viii–1978, J. T. Sorensen (JTS 78H144), *P. flexilis,* (apt.). *WYOMING*. ALBANY Co.: 5 km S.W. Woods Landing, Hwy. 230, 2560 m, 15–viii–1978, J. T. Sorensen (JTS 78H92), *P. flexilis*, (apt.).

Essigella Relationships and Nomenclatural Clarification

As noted Sorensen (in prep. a) revises *Essigella*, and details relationships discussed in Sorensen (1983, 1987). While Sorensen (1983) circumscribed all *Essigella* species using multivariate statistical treatments, I consider that work (a thesis) as unpublished for taxonomic nomenclatural purposes under I.C.Z.N. rules (1985: Articles 8–A1, 8–A3, 8–B presently, 8–C, 9–2, 9–3, 9–4 and 9–6). I have thus avoided publishing nomens which could be considered valid under applicable I.C.Z.N. rulings to this point. To clarify matters, however, it should be noted that the new species described here are referred to by the following manuscript names in Sorensen (1983): (1) *"E. kathleenae"* [acronym "KATH"], (2) *"E. alyeska"* [acronym "ALYE"] and (3) *E. kirki* as *"E. hottesi"* [acronym HOTT]. Sorensen (1987) details the proposed phylogeny for the genus, and treats *E. kathleeni* as "sp. J", *E. kirki* as "sp. K" and *E. alyeska* as "sp. D".

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